CLAIMS

1. Method of evaluating the noise related to data streams issuing from a turbo-encoder having at least first and second encoders, these data streams being intended for a turbodecoder having at least first and second elementary decoders, according to which:

- an operation of estimating the noise (70) is performed, consisting of determining an estimate of the noise related to the systematic output of the turbo-encoder, an estimate of the noise related to the data stream issuing from the first encoder and an estimate of the noise related to the data stream issuing from the second encoder;

said method being characterised in that it also includes steps according to which the following operations are performed:

- an addition operation (72) of adding at least two of the estimate of the noise related to the systematic output, the estimate of the noise related to the data stream issuing from said first encoder, and the estimate of the noise related to the data stream issuing from said second encoder;

- a division operation (74) of dividing the result of said addition operation by the number of augends added in said addition operation;

- an inversion operation (76) of determining the inverse of the result of said division operation as a noise factor; and

- a multiplication operation (78) of multiplying said noise factor with the data stream issuing from at least one of said first encoder, second encoder and systematic output.

2. Method according to Claim 1, characterised in that:

- in said addition operation (72), the estimate of the noise related to said systematic output, the estimate of the noise related to the data stream issuing from the first encoder, and the estimate of the noise related to the data stream issuing from the second encoder are added,

- in said division operation (74), the result of said addition operation is divided by three, and

- in said multiplication operation (78), said noise factor is multiplied with each of the data streams issuing from said first encoder, second encoder, and systematic output.

3. Method according to Claim 1, characterised in that:

- said addition operation (72) comprises a first and second addition operations, said first addition operation consisting of adding the estimate of the noise related to said systematic output and the estimate of the noise related to the data stream issuing from the first encoder, and said second addition operation consisting of adding the estimate of the noise related to said systematic output and the estimate of the noise related to the data stream issuing from the second encoder,

- said division operation (74) comprises a first and second division operations, said first division operation consisting of dividing by two the result of said first addition operation, and second division operation consisting of dividing by two the result of said second addition operation,

- in said inversion operation (76), the inverse of the results of said first and second division operations are determined as first and second noise factors, respectively, and

- said multiplication operation (78) comprises a first, second, third and fourth multiplication operations, said first multiplication operation consisting of multiplying the data stream issuing from said first encoder by said first noise factor, said second multiplication operation consisting of multiplying the data stream issuing from said systematic output and intended for the first elementary turbodecoder by said first noise factor, said third multiplication operation consisting of multiplying the data streams issuing from the second encoder by said second noise factor, and said fourth multiplication operation consisting of multiplying the data streams issuing from said systematic output and intended for the second elementary turbodecoder by said second noise factor.

4. Method according to Claim 1, 2 or 3, characterised in that, during the noise estimation operation (70), the moving average of the sum of the Euclidian distances of each noisy symbol received to the closest theoretical symbol is determined respectively for each symbol in the data stream issuing

from the systematic output, for each symbol in the data stream issuing from the first encoder and for each symbol in the data stream issuing from the second encoder.

5. Method according to Claim 4, characterised in that, for determining said moving average, a comparison operation is performed, consisting of determining to which Voronoï region each noisy symbol received belongs.

6. Method according to any of the preceding claims, characterised in that it also includes a step according to which:

- a delay application operation (80) is performed, consisting of applying a delay to the data streams issuing from the systematic output and the first and second encoders, prior to the multiplication operations (78).

7. Method according to any of the preceding claims, characterised in that said first and second encoders are recursive systematic convolutional encoders.

8. Device for evaluating the noise related to data streams issuing from a turbo-encoder having at least first and second encoders, said data streams being intended for a turbodecoder having at least first and second elementary decoders, said device having:

- noise estimation means (21, 23, 25, 41, 42, 44), for determining an estimate of the noise related to the systematic output of the turbo-encoder, an estimate of the noise related to the data stream issuing from the first encoder and an estimate of the noise related to the data stream issuing from the second encoder;

said device being characterised in that it also has:

- addition means (26, 45, 46), for adding at least two of the estimate of the noise related to said systematic output, the estimate of the noise related to the data stream issuing from said first encoder, and the estimate of the noise related to the data stream issuing from said second encoder;

- division means (27, 47, 48), for dividing the result supplied by said addition means (26, 45, 46) by the number of augends added by said addition means;

- inversion means (27, 47, 48), for determining the inverse of the result supplied by said division means (27, 47, 48) as a noise factor; and

- multiplication means (28, 29, 30, 49, 50, 51, 52), for multiplying said noise factor with the data stream issuing from at least one of said first encoder, second encoder and systematic output.

9. Device according to Claim 8, characterised in that:

- said addition means (26) is adapted to add the estimate of the noise related to said systematic output, the estimate of the noise related to the data stream issuing from the first encoder, and the estimate of the noise related to the data stream issuing from the second encoder,

- said division means (27) is adapted to divide the result of said addition means by three, and

- said multiplication means (28, 29, 30) is adapted to multiply said noise factor with each of the data streams issuing from said first encoder, second encoder, and systematic output.

10. Device according to Claim 8, characterised in that:

- said addition means (45, 46) comprises first and second addition means, said first addition means (45) is adapted to add the estimate of the noise related to said systematic output and the estimate of the noise related to the data stream issuing from the first encoder, and said second addition means (46) is adapted to add the estimate of the noise related to said systematic output and the estimate of the noise related to the data stream issuing from the second encoder,

- said division means (47, 48) comprises a first and second division operations, said first division means (47) is adapted to divide by two the result of said first addition means, and second division means (48) is adapted to divide by two the result of said second addition means,

- said inversion means (47, 48) is adapted to determine the inverse of the results of said first and second division operations as first and second noise factors, respectively, and

- said multiplication means (49, 50, 51, 52) comprises a first, second, third and fourth multiplication means, said first multiplication means

(49) is adapted to multiply the data stream issuing from said first encoder by said first noise factor, said second multiplication means (50) is adapted to multiply the data stream issuing from said systematic output and intended for the first elementary turbodecoder by said first noise factor, said third multiplication means (51) is adapted to multiply the data streams issuing from the second encoder by said second noise factor, and said fourth multiplication operation means (52) is adapted to multiply the data streams issuing from said systematic output and intended for the second elementary turbodecoder by said second noise factor.

11. Device according to Claim 9 or 10, characterised in that said noise estimation means (41, 42, 44) include means (5, 82) for determining the moving average of the sum of the Euclidian distances from each noisy symbol received to the closest theoretical symbol, respectively for each symbol in the data stream issuing from the systematic output, for each symbol in the data stream issuing from the first encoder and for each symbol in the data stream issuing from the second encoder.

12. Device according to Claim 11, characterised in that said means (5, 82) for determining said moving average include comparison means (10, 13) for determining to which Voronoï region each noisy symbol received belongs.

13. Device according to any of Claims 8 to 12, characterised in that it also includes:

- delay application means (40, 39, 43), for applying a delay to the data streams issuing from the systematic output and the first and second encoders, said delay application means (40, 39, 43) being disposed upstream of the multiplication means (50, 49, 52, 51).

14. Device according to any of Claims 8 to 13, characterised in that said first and second encoders are recursive systematic convolutional encoders.

15. Digital signal processing apparatus, characterised in that it has means adapted to implement a method according to any of Claims 1 to 7.

16. Digital signal processing apparatus, characterised in that it has a ~~device according to any of Claims 8 to 14.~~

17. Telecommunications network, characterised in that it includes means adapted to implement a method according to any of Claims 1 to 7.

18. Telecommunications network, characterised in that it includes a device according to any of Claims 8 to 14.

19. Mobile station in a telecommunications network, characterised in that it has means adapted to implement a method according to any of Claims 1 to 7.

Sub #3 cancel.

20. Mobile station in a telecommunications network, characterised in that it has a device according to any of Claims 8 to 14.

21. Information storage means which can be read by a computer or microprocessor storing instructions of a computer program, characterised in that it implements a method according to any of Claims 1 to 7.

22. Information storage means which is removable, partially or totally, and which can be read by a computer or microprocessor storing instructions of a computer program, characterised in that it implements a method according to any of Claims 1 to 7.

23. Computer program product, characterised in that it comprises software code portions for implementing a method according to any of Claims 1 to 7.